

Sex change in coral reef fish (16p. Bold)

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Several types of hermaphroditism are seen among coral reef fish. Individuals of some fishes bear gonads containing both mature ovarian and testicular tissues. Some fishes change sex from male to female (protandrous sex change), others change from female to male (protogynous sex change), and a few can change sex either way and multiple times (both-way sex change). In many cases, sex change is cued by social factors, such as the disappearance of a male or female from a group. These phenomena reveal that the mechanisms of sex determination and sex differentiation in fishes, in being diverse and more plastic, differ from those of other higher vertebrates. We believe that this sexual plasticity may contribute to the diversity and maintenance of species in coral reef fish. Our research focuses on analyzing the mechanism of sex change from an endocrinological viewpoint, using morphological, physiological, and molecular techniques. In order to further characterize protandrous, protogynous, and both-way sex changes, we carry out experimental studies with the sea-anemone fish *Amphiprion clarkii*, the three spotted wrasse *Halichoeres trimaculatus*, the saddle back wrasse *Thalassoma duperrey*, the grouper *Epinephelus merra*, and the gobiid fish *Trimma okinawae*, respectively.

We succeeded in inducing *in vitro* spermatogenesis by tissue culture of ovaries in *H. trimaculatus*. Ovarian fragments of wrasse were cultured in medium containing methyltestosterone (MT). After a few weeks of *in vitro* culture, ovaries cultured in medium, with and without MT, showed degeneration of oocytes and proliferation of presumed spermatogonia on the periphery of lamella. It is well accepted that it is impossible to induce sex reversal from matured ovary or testis into testis or ovary respectively in gonochoristic fish. However, on the basis of our findings on sex change in fish, we have now succeeded in achieving sex reversal from matured ovaries to matured testes in the gonochoristic tilapia, *Oreochromis niloticus*. We gave aromatase inhibitor (AI, fadrozole) to mature female tilapia for 6 month. Subsequently histological evaluation revealed that all fish treated with AI had gonads with testicular tissue containing active spermatogenic germ cells. This result strongly suggests that some germ cells and somatic cells in matured ovary in gonochoristic fish have bipotentiality, which is the ability to differentiate into either ovarian tissue or testicular tissue.

In this presentation, I introduce the sexuality of fishes in Okinawa, sex change by social control, gonadal restructuring during the process of sex change and endocrine mechanism of sex change. (14p)